ART. XXV.—*A New Tortoise and a Supplementary Note on the Gavial, Tomistoma americana;* by E. H. SELLARDS.

IN connection with a paper on pebble phosphates the writer, in 1915, mentioned and illustrated a large land tortoise from the Tertiary of Florida.* Additional specimens of this tortoise have now been obtained indicating that it is a characteristic and not uncommon fossil of the Florida land pebble phosphate deposits. The species apparently is new and may be known as *Testudo hayi* in recognition of the studies of Testudinata by Dr. O. P. Hay. The type specimen of this species, which includes a part of the carapace and plastron of a single individual, was contributed by the Phosphate Mining Company, Nichols, Florida. A second specimen including a considerable part of the carapace has been obtained from the Amalgamated Phosphate Company, Brewster, Florida. Both specimens are from the Bone Valley formation which is either of late Miocene or of early Pliocene age. The origin of this formation has been discussed and a number of the vertebrate fossils illustrated in the paper to which reference has been made.

Testudo hayi, sp. nov.—This species includes large tortoises which reach a size of approximately four feet in width by five feet in length. The height of the carapace is estimated at twenty-seven inches. Of the neurals the second is octagonal or nearly so. The remaining neurals four to eight are hexagonal. The proximal end of the second costal is slightly reduced in width and comes in contact with the second neural only, while the third costal touches the second, third and fourth neurals. The first or penultimate supra-pygal is large and rests upon the eleventh marginals and the pygal. The second or ultimate supra-pygal, on the contrary, is much reduced. The length of the xiphiplastron from the bottom of the xiphiplastral notch to the outer margin at the suture with the hypoplastron is 300^{mm}.

Under the name *Testudo crassiscutata*, Leidy in 1889 described a tortoise obtained on Peace Creek, Florida. The type of Leidy's species includes portions of the anterior and posterior lobes of the plastron, a femur and a tibia and fragments of the carapace. By comparing the posterior part of the plastron it is seen that the median notch of *T. hayi* is deeper and more acute than is that of *T. crassiscutata*. The exterior wall of the hypoplastron of *T. hayi* is vertical while in *T. crassiscutata* the exterior wall of this bone slopes inward. Although representing a larger individual the carapace of *T. hayi* is thinner than that referred to *T. crassiscutata*.

* Fla. Geol. Surv., Seventh Annual Report, pp. 70, 75, figs. 7 and 9, 1915.

FIG. 1.

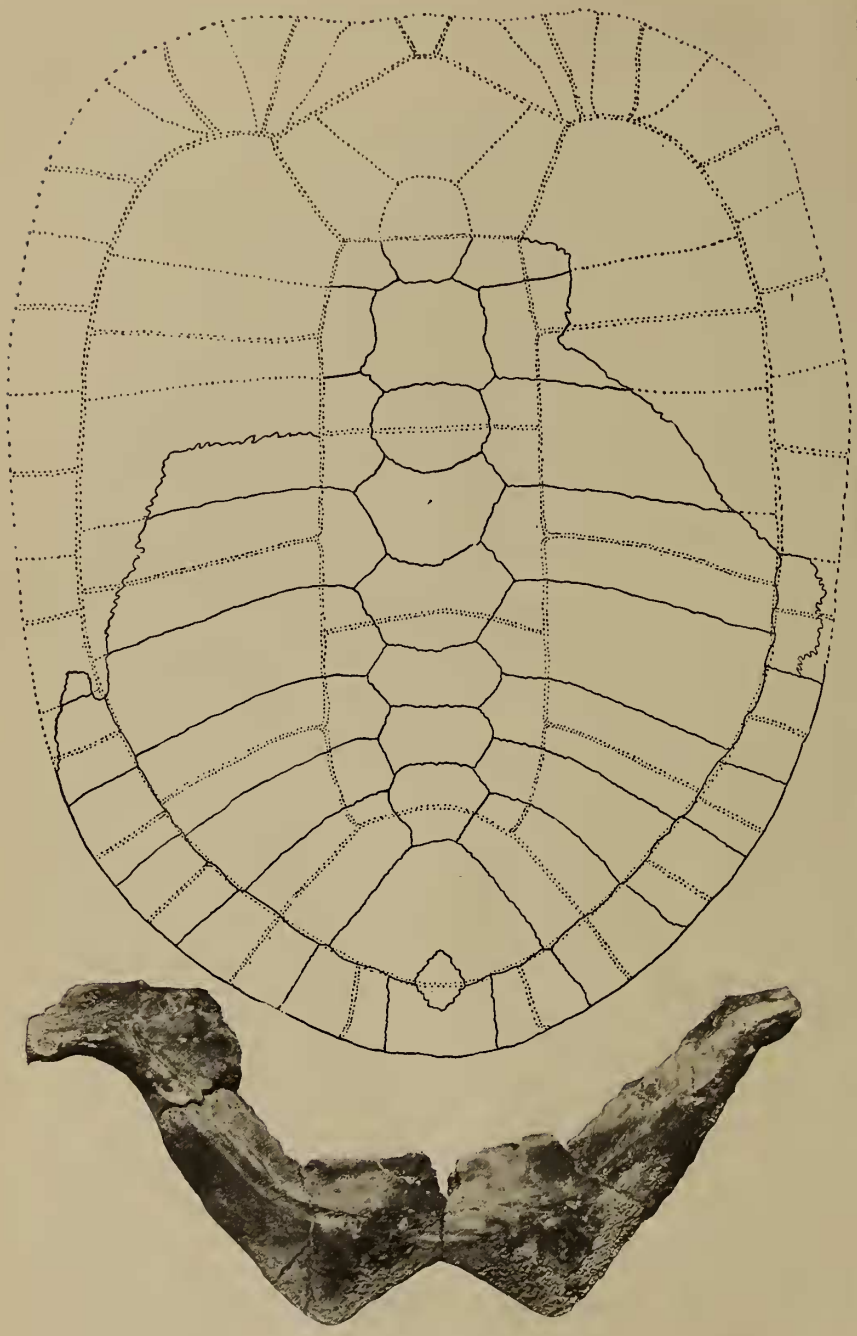


FIG. 1. *Testudo hayi.* Type. Carapace and posterior lobe of plastron. One-twelfth natural size. Fla. Surv. coll. No. 5001. The front part of the carapace which is lacking in the specimen is restored.

Supplementary Note on the Gavial, Tomistoma americana.

The gavial, *Tomistoma americana*, described by the writer in 1915, is of special interest from the fact that it is at present the only known member of this group from the American Cenozoic. Of this form there has been known heretofore only the rostrum which served as the type of the species and a fragment of a lower jaw which was regarded as a paratype.* Recently, however, there has been obtained from the same locality and from the same deposit as the type specimens, parts of the lower jaws of ten or twelve individuals, with which is associated a few pieces of upper jaws, dermal plates and a vertebra. From the specimens now at hand it is possible to add to the description of the lower jaw. The rostrum which originally served as the type of the species represents, as shown by the specimens now at hand, an individual by no means fully grown. As in the case of the specimens first described, the additional material representing this gavial has been obtained by the Amalgamated Phosphate Company at Brewster, Florida, and has been contributed to the Florida Geological Survey through the general manager of the company, Mr. Anton Schneider.

The front part of the jaw of this gavial is represented by specimens Nos. 6158, 5871, 5875, 5876 and 5879 of the Florida Survey collection. The two front teeth of the lower jaw, as shown by this new material, incline upward, forward and outward, and thus pass between the first and second teeth of the premaxilla which is grooved to receive them. The second mandibular tooth is strongly developed and is separated by a considerable space from the first tooth, and passes between the third and fourth teeth of the upper jaw. The groove in the premaxilla which receives this tooth is more pronounced as shown by specimen No. 6158 in the large individuals of the species than on the specimen which served as the type of the species. Into the broad groove between the first and second lower teeth is received the second and third upper teeth. The space between the first and second lower teeth shows a proportionate increase with age, the teeth of the young specimen being about equally spaced. The third lower tooth is small and falls between the fourth and fifth teeth of the premaxilla, being there received in a pit at the outer side of the bone which in old individuals becomes quite pronounced. The fourth mandibular tooth is the largest of the lower jaw and passes into the notch or constriction of the rostrum and hence between the fifth and sixth upper teeth. From the second lower and third upper to the tenth lower and eleventh upper the teeth alternate and interlock, the side of the jaws being

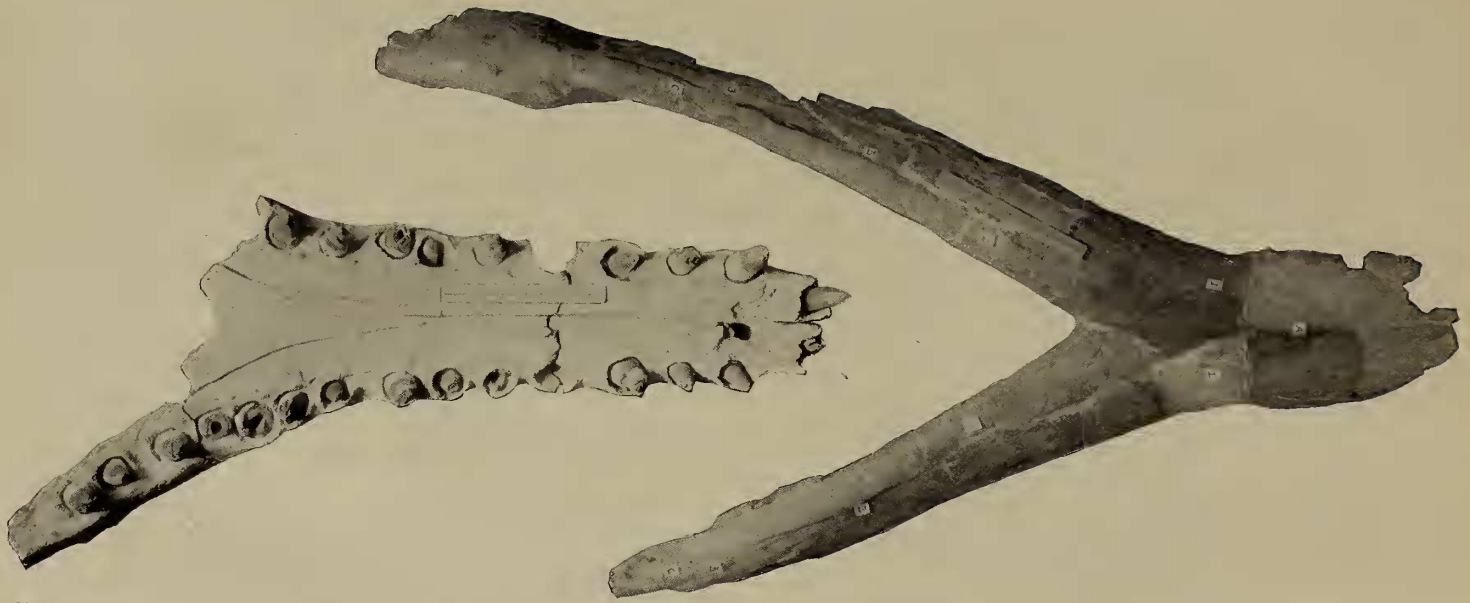
* This Journal, vol. xl, pp. 135–138, 1915.

grooved between each tooth to receive the corresponding tooth from the opposite jaw. Back of the tenth lower and eleventh upper the teeth do not pass to the outer side of the jaw, but are received in pits in the jaw.

The symphysis of the jaw, as shown by specimens Nos. 6158 and 5879, begins opposite the eleventh or the twelfth mandibular tooth. In specimen No. 5880, the front part of which is wanting, may be seen sockets for seven teeth back of the symphysis, representing apparently the eleventh to the seventeenth or the twelfth to the eighteenth teeth inclusive, from which it appears that the full number of teeth in the lower jaw is seventeen or eighteen. The splenials, as noted in the writer's original description, take part in the symphysis and extend forward, as shown by the specimens now on hand, to a point opposite the seventh mandibular tooth. The under surface of the back part of the lower jaw is well shown by specimen No. 5891 which is illustrated in the accompanying text figure. The bones seen from the underside of the jaw are the dentaries, splenials and angulars. The termination of the dentaries is not definitely shown, but these bones may be seen to extend approximately one half the length of the ramus of the jaw. The limits of the splenials are very well shown and are seen to extend somewhat more than one half the length of the ramus. The angular is wedged in between the splenials and the dentaries and forms the lower margin of the jaw at the angle.

While no one jaw has been found complete, yet an approximate measurement of the lower jaw may be obtained by combining measurements from the two largest specimens of the collection. In the larger of these, No. 6158, the front part of the jaw as already noted is preserved, while in the other, No. 5891, which is but slightly smaller, the back part of the jaw is practically complete. The symphysis of the jaw of the large specimen measures 610^{mm}, while on the slightly smaller specimen that part of the jaw back of the symphysis measures in a direct line following the axis of the jaw 725^{mm}. The full length of the lower jaw of a large specimen of this gavial was, therefore, somewhat more than 1335^{mm}, or about four feet and three or four inches. By way of comparison it may be noted that the splenial bones in this species take part in the formation of about four-elevenths of the symphysis; while the symphysis itself includes about four-ninths of the entire length of the jaw. The width of the jaw of the largest specimen, measured at the forward end of the splenial, is 170^{mm}, the jaw being proportionately broader than that of the modern species of the genus.

A number of dermal plates of crocodillians are found at this locality which with little doubt are referable to this spe-



FIGS. 2 and 3. *Tomistoma americana*, Fla. Surv. coll. Nos. 5891 and 6158. One-eighth natural size. The rule seen in the photograph has a total length of 60mm. In front of "A" the jaw consists of the dentaries alone; back of "A" the splenials intervene between the dentaries. Although not complete the dentaries (1) may be seen to extend to a point midway between "B" and "C" where they form the exterior of the jaw. The splenials (2) extend forward taking part in the symphysis of the jaw to "A." In the ramus they extend back to "C" forming the lower part of the inner margin. The angular (3) which is wedged in between the dentaries and the splenials, extends forward to "B." The length of the ramus of the jaw as shown by fig. 2 is 775mm, or measured along the axis of the jaw in a direct line, 725mm. The symphysis of the jaw as shown by fig. 3 measures 610mm.

eies. These plates are heavy deeply pitted pieces of bone, the largest of which measure 100 by 130^{mm} in size and are 16^{mm} thiek. A vertebra, the centrum of which is 70^{mm} long by 50^{mm} wide, has been obtained from this loeality and presnmably represents this species. This vertebra is probably the seventh of the series.

The skull of this extinct gavial is somewhat more massive than is that of the modern species. Thus a jaw of *T. schlegeli*, the symphysis of which measures 610^{mm}, has a width at the forward end of the splenials of 170^{mm}, the width being more than one-fourth the length. In the recent speeies the width of the jaw at the same plaee is eontained in the length 6½ times, thus indieating a more narrow jaw and skull. The symphysis of the jaw of *T. schlegeli* begins opposite the fourteenth tooth, while in *T. americana* the symphysis as previously stated begins opposite the eleventh or twelfth tooth. In the proportionate length of the symphysis to the jaw as a whole, however, as well as in the extent to whieh the splenials enter into the symphysis, the two species do not differ to any great extent.

The body proportions of this gavial probably do not differ greatly from those of the existing species of the genus, and henee by eomparative measurements it is possible to form a reasonably elose estimate of the size of this extinet animal. Upon eomparing the modern species, *Tomistoma schlegeli*, it is found that in an individual, the full length of the body of which is 9 feet and 7 inehes, the lower jaw measnres 2 feet and 2 inehes.* Assuming that a somewhat similar proportion holds between the length of the jaw and of the body of *T. americana*, and applying these measurements, the eonelusion is reaehed that large individuals of the Florida gavial, the jaw of which exceeds 4 feet, attain a length of 18 or 19 feet, and henee were somewhat larger than the existing gavial of this genus whieh seldom exeeeds 15 feet in length.

* Measurements from the recent skeleton kindly supplied by Geo. M. Ward of the Ward Natural Science Establishment.